

REMARKS

Applicants respectfully request reconsideration of the above-identified application in view of the foregoing amendments and the following remarks.

In the December 3, 2002 Office Action, the Examiner noted that claims 1-15 were pending in the application and that claims 1-15 were rejected. Specifically, the Examiner stated that “molding and compressing are method of making limitation and are not given any patentable weight in an apparatus claim.” *Office Action, pages 5-6*. By this Amendment, applicants have amended the independent claims (claims 1 and 10) to recite that the molded body comprises a compressed hydrogen storage material powder.

Applicants believe that claims 1-15 are in condition for allowance. The Examiner’s rejections are respectfully traversed below.

Finality Of The Office Action Is Improper And Should Be Withdrawn

Applicants respectfully submit that the finality of the Office Action is improper and should be withdrawn. The factual bases for the Examiner’s rejections are missing and should be clarified before finality could be appropriate.

The Examiner’s §102 rejections do not explain – as required – how each and every element of the rejected claims is found in each of Rockenfeller et al. and Asami et al. In fact, in these §102 rejections, the Examiner has not addressed a single element of the claims. Applicants are not required to guess at the content of an Examiner’s rejection. *In re Oetiker*, 977 F.2d 1443, 1449 (Fed. Cir. 1992) (“The examiner cannot sit mum, leaving the applicant to shoot arrows into the dark hoping to somehow hit a secret objection harbored by the examiner.”). The Examiner’s §103 rejections, in so far as they rely upon Rockenfeller et al. and/or Asami et al., suffer from the

same problem. Should these rejections be maintained, Applicants request that the Examiner explain how Rockenfeller et al. and/or Asami et al. meet the claims' limitations.

Because Applicants believe that the factual bases for the rejections stated in the Office Action are not fully developed for appeal, Applicants respectfully request withdrawal of the finality of the office action.

Rejection Under 35 U.S.C. §102(b) – Rockenfeller et al.

In the Office Action, the Examiner rejected claims 1-2, 4 and 8-9 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,165,247 (Rockenfeller et al.). However, the Examiner has not identified where each limitation of the rejected claims is allegedly found in Rockenfeller et al..

The present invention is drawn to a reservoir for storing hydrogen comprising a housing, a molded body comprising a compressed hydrogen storage material powder accommodated in the housing, a heat medium passage and a hydrogen passage. *See* claim 1. The advantage of having a molded body comprising a compressed hydrogen storage material powder is an increase in heat conductivity. This is illustrated in Figure 5 and explained in the specification at page 11, lines 26-34 (emphasis added):

Fig. 5 is a graph representing the heat conductivity of an HM molded body and the copper rate of the same. Sample A is HM powder as a reference example. Sample B is an HM molded body that contains zero weight percent of copper. Sample C is an HM molded body that contains thirty weight percent of copper. Sample D is an HM molded body that contains fifty weight percent of copper. As shown in Fig. 5, even Sample B has an increased heat conductivity, as compared to Sample A, which is HM powder.

In contrast, Rockenfeller et al. is directed to an apparatus for being permanently or selectively installed with a refrigeration or chemical system whereby a gas may be evacuated from the system and adsorbed on a solid adsorbent material, and later desorbed and returned to the system. Col. 1, lines 25-30. The physical structure of the "solid adsorbent material" is not one of a molded body or compressed particles, as a barrier is necessary to retain the solid adsorbent particles in place:

Extending around the exterior of the solid adsorbent is a barrier 16 for retaining the solid adsorbent particles or mass in place around the pipes and in contact with the heat exchange plates or surfaces.

Col. 2, lines 60-63. Thus, Rockenfeller et al. fails to disclose a molded body comprising a compressed hydrogen storage material powder.

As claims 1-2, 4 and 8-9 all recite this compressed hydrogen storage material powder limitation, Rockenfeller et al. cannot anticipate these claims. Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Rejection Under 35 U.S.C. §102(b) – Asami et al.

In the Office Action, the Examiner rejected claims 1-4, 6-7 and 9 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,393,924 (Asami et al.). However, the Examiner has not identified where each limitation of the rejected claims is allegedly found in Asami et al..

The present invention is drawn to a reservoir for storing hydrogen comprising a housing, a molded body comprising a compressed hydrogen storage material powder accommodated in the housing, a heat medium passage and a hydrogen passage. *See* claim 1. As described above, the advantage of having a molded body comprising a compressed hydrogen storage material powder is an increase in heat conductivity. This is illustrated in Figure 5 and explained in the

specification at page 11, lines 26-34.

In contrast, Asami et al. is directed to a heat exchange apparatus for use with hydrogen storing material, which is characterized in that a regenerator chamber packed with a heat storing material is disposed in between a high temperature fluid pathway and a low temperature pathway of the heat exchanger. Col. 2, lines 9-14. The physical structure of the hydrogen storing material is not one of a molded body comprising a hydrogen storage material powder:

The hydrogen storing material which is packed in regenerator chamber 4 is a material prepared by pulverizing an intermetallic compound such as iron-titanium into fine powder, mixing the fine powder with an alumina gel, a silica gel or other stable inorganic or organic carrier, and solidifying the mixture by baking it in an atmosphere suitable to it such as under vacuum or in an inert gas atmosphere or by forming with use of an appropriate binder.

Col. 4, lines 54-62. Thus, Asami et al. fails to disclose a molded body comprising a compressed hydrogen storage material powder.

As claims 1-4, 6-7 and 9 all recite this compressed hydrogen storage material powder limitation, Asami et al. cannot anticipate these claims. Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Rejection Under 35 U.S.C. §103(a) – Rockenfeller et al. and Asami et al.

In the Office Action, the Examiner rejected claim 5 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,165,247 (Rockenfeller et al.) and U.S. Patent No. 4,393,924 (Asami et al.). According to the Examiner, Rockenfeller et al. and Asami et al. disclose all the claimed features of the invention, with the exception of copper as the highly heat conductive material.

However, as demonstrated above, Rockenfeller et al. and Asami et al. do not disclose all the claimed features of the invention. The present invention is drawn to a reservoir for storing hydrogen comprising a housing, a molded body comprising a compressed hydrogen storage material powder accommodated in the housing, a heat medium passage, a heat medium and a hydrogen passage. *See* claim 5. Rockenfeller et al. discloses solid adsorbent particles which are retained in place by a barrier. Col. 2, lines 60-63. Asami et al. discloses baked particles or particles held together by a binder. Col. 4, lines 54-62. Neither Rockenfeller et al. nor Asami et al. discloses a molded body comprising a compressed hydrogen storage material powder. Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Rejection Under 35 U.S.C. §103(a) – Rockenfeller et al. in view of Nikai, Januschkowetz or Yanagi et al.

In the Office Action, the Examiner rejected claims 3, 6-7 and 10-12 under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,165,247 (Rockenfeller et al.) in view of JP 3-31663 (Nikai), U.S. Patent No. 4,581,049 (Januschkowetz) or JP 3-244974 (Yanagi et al.). According to the Examiner, Rockenfeller et al. discloses all the claimed features of the invention with the exception of the claimed shapes – a flat duct, a molded body with a plate-like shape, a flat heat medium passage and a flat hydrogen passage.

However, as demonstrated above, Rockenfeller et al. does not disclose all the claimed features of the invention. The present invention is drawn to a reservoir for storing hydrogen comprising a housing, a molded body comprising a compressed hydrogen storage material powder accommodated in the housing, a heat medium passage and a hydrogen passage (claims 3 and 6-7). Additionally, the present invention is drawn to a reservoir for storing hydrogen comprising a housing, a plurality of storage units stacked in the interior of the housing, wherein each storage unit includes a pair of plate-like molded bodies comprising a compressed hydrogen

storage material powder, a heat exchanger and a plurality of flat hydrogen passages (claims 10-12). Rockenfeller et al. discloses solid adsorbent particles which are retained in place by a barrier. Col. 2, lines 60-63. Rockenfeller et al. does not disclose a molded body comprising a compressed hydrogen storage material powder.

Neither Nikai, Januschkowetz or Yanagi et al. make up for the deficiencies of Rockenfeller. Nikai is drawn to an adsorption type freezer. *See* Abstract. Januschkowetz is drawn to a solid absorber apparatus for a cyclic absorption process. *See* Col. 4, lines 36-37. Yanagi et al. is drawn to an adsorption type freezing device. *See* Abstract. Nikai, Januschkowetz or Yanagi et al. were cited by the Examiner as showing flow passages being flat for the purpose of obtaining a compact heat exchanger. None of these references teaches a molded body comprising a compressed hydrogen storage material powder. Thus, their combination with Rockenfeller et al. would not render obvious claims 3, 6-7 and 10-12.

Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Rejection Under 35 U.S.C. §103(a) – Rockenfeller et al. in view of Nikai, Januschkowetz or Yanagi et al. and further in view of Onishi et al.

In the Office Action, the Examiner rejected claim 13 under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,165,247 (Rockenfeller et al.) in view of JP 3-31663 (Nikai), U.S. Patent No. 4,581,049 (Januschkowetz) or JP 3-244974 (Yanagi et al.) in view of JP 62-288495 (Onishi et al.). According to the Examiner, Rockenfeller et al. in view of Nikai, Januschkowetz or Yanagi et al. discloses all the claimed features of the invention with the exception of the body including a chamfer.

However, as demonstrated above, Rockenfeller et al., as modified, does not disclose all the claimed features of the invention. The present invention is drawn to a reservoir for storing

hydrogen comprising a housing, a plurality of storage units stacked in the interior of the housing, wherein each storage unit includes a pair of plate-like molded bodies comprising a compressed hydrogen storage material powder, a heat exchanger and a plurality of flat hydrogen passages. *See* claim 10. Rockenfeller et al., as modified, does not disclose a molded body comprising a compressed hydrogen storage material powder.

Onishi et al. does not make up for the deficiencies of Rockenfeller et al., as modified. Onishi et al. is drawn to a heat exchanger. *See* Abstract. The Examiner cited Onishi et al. for disclosing bodies including a chamfer for the purpose of having an efficient packing of the bodies within a housing which increases the filling rate of hydrogen. Onishi et al. does not teach a molded body comprising a compressed hydrogen storage material powder. Thus, its combination with Rockenfeller et al., as modified, would not render obvious claim 13.

Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Rejection Under 35 U.S.C. §103(a) – Rockenfeller et al. in view of Nikai, Januschkowetz or Yanagi et al. and further in view of Davis

In the Office Action, the Examiner rejected claim 14 under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,165,247 (Rockenfeller et al.) in view of JP 3-31663 (Nikai), U.S. Patent No. 4,581,049 (Januschkowetz) or JP 3-244974 (Yanagi et al.) in view of U.S. Patent No. 6,237,680 B1 (Davis). According to the Examiner, Rockenfeller et al. in view of Nikai, Januschkowetz or Yanagi et al. discloses all the claimed features of the invention with the exception of a connecting section between upstream and downstream sections.

However, as demonstrated above, Rockenfeller et al., as modified, does not disclose all the claimed features of the invention. The present invention is drawn to a reservoir for storing hydrogen comprising a housing, a plurality of storage units stacked in the interior of the housing,

wherein each storage unit includes a pair of plate-like molded bodies comprising a compressed hydrogen storage material powder, a heat exchanger and a plurality of flat hydrogen passages. *See* claim 10. Rockenfeller et al., as modified, does not disclose a molded body comprising a compressed hydrogen storage material powder.

Davis does not make up for the deficiencies of Rockenfeller et al., as modified. Davis is drawn to a radiator which utilizes laminar flow to more efficiently cool a liquid coursing through the radiator. Col. 1, lines 6-8. The Examiner cited Davis for disclosing that it is known to have a connecting section between upstream and downstream sections for the purpose of increasing the fluid flow length which increases the time the fluid exchanges heat which increases the overall heat exchange efficiency. Davis does not teach a molded body comprising a hydrogen storage material powder. Thus, its combination with Rockenfeller et al., as modified, would not render obvious claim 14.

Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

Rejection Under 35 U.S.C. §103(a) – Rockenfeller et al. in view of Nikai, Januschkowetz or Yanagi et al. and further in view of Davis, and still further in view of Farfaletti-Casali et al.

In the Office Action, the Examiner rejected claim 15 under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 5,165,247 (Rockenfeller et al.) in view of JP 3-31663 (Nikai), U.S. Patent No. 4,581,049 (Januschkowetz) or JP 3-244974 (Yanagi et al.) in view of U.S. Patent No. 6,237,680 B1 (Davis) and still further in view of U.S. Patent No. 4,362,207 (Farfaletti-Casali et al.). According to the Examiner, Rockenfeller et al., as modified discloses all the claimed features of the invention with the exception of the header including both upstream and downstream sections.

However, as demonstrated above, Rockenfeller et al., as modified, does not disclose all the claimed features of the invention. The present invention is drawn to a reservoir for storing hydrogen comprising a housing, a plurality of storage units stacked in the interior of the housing, wherein each storage unit includes a pair of plate-like molded bodies comprising a compressed hydrogen storage material powder, a heat exchanger and a plurality of flat hydrogen passages. *See claim 10.* Rockenfeller et al., as modified, does not disclose a molded body comprising a compressed hydrogen storage material powder.

Farfaletti-Casali et al. does not make up for the deficiencies of Rockenfeller et al., as modified. Farfaletti-Casali et al. is drawn to an integrated system adapted to use and exploit substances in solid and paste form which are capable of exo-endothermic thermochemical reactions as a means for term storage of thermal energy. Col. 1, lines 6-11. The Examiner cited Farfaletti-Casali et al. for disclosing that it is known to have a header including upstream and downstream sections for the purpose of reducing the number of parts and reducing overall size, weight and cost. Farfaletti-Casali et al. does not teach a molded body comprising a hydrogen storage material powder. Thus, its combination with Rockenfeller et al., as modified, would not render obvious claim 15.

Accordingly, withdrawal of the Examiner's rejection is respectfully requested.

CONCLUSION

For all the reasons advanced above, Applicants respectfully submit that the application is in condition for allowance and that action is earnestly solicited.

The Commissioner is hereby authorized to charge any additional fees which may be required for this amendment, or credit any overpayment to Deposit Account No. 13-4500, Order

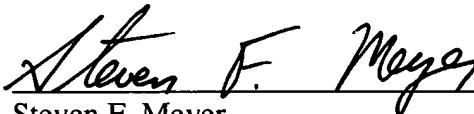
No. 5000-4853.

In the event that an extension of time is required, or may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 13-4500, Order No. 5000-4853.

Respectfully submitted,
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Amendments Showing Insertions and Deletions

IN THE CLAIMS

Please amend claims 1 and 10 to read as follows:

- 1. (Twice Amended) A reservoir for storing hydrogen, comprising:
 - a housing;
 - a molded body comprising a compressed hydrogen storage material powder accommodated in the housing[, wherein the molded body is formed by compressing a hydrogen storage material powder], the molded body causes exothermic reaction when absorbing hydrogen and causes endothermic reaction when releasing hydrogen, and the molded body has a first side and a second side opposite to the first side;
 - a heat medium passage formed in the interior of the housing to face the first side of the molded body, wherein heat is transmitted from the molded body to a heat medium in the heat medium passage when the molded body absorbs hydrogen, and heat is transmitted from the heat medium in the heat medium passage to the molded body when the molded body releases hydrogen; and
 - a hydrogen passage formed in the interior of the housing to face the second side of the molded body.
- 10. (Twice Amended) A reservoir for storing hydrogen, comprising:
 - a housing;
 - a plurality of storage units stacked in the interior of the housing, wherein each storage unit includes:
 - a pair of plate-like molded bodies comprising a compressed [formed by compressing a] hydrogen storage material powder, wherein each molded body causes

exothermic reaction when absorbing hydrogen and causes endothermic reaction when releasing hydrogen, the molded body includes a first flat side and a second flat side opposite to the first side, and the molded bodies are located with respect to each other such that the first sides face each other; and

a heat exchanger located between the molded bodies, wherein the heat exchanger includes a flat duct in which a heat medium flows, the duct contacts the first side of each molded body, heat is transmitted from the molded bodies to the heat medium in the duct when the molded bodies absorb hydrogen, and heat is transmitted from the heat medium in the duct to the molded bodies when the molded bodies release hydrogen; and

a plurality of flat hydrogen passages formed in the interior of the housing to face the second sides of the molded bodies.